

UNITED STATES  
DEPARTMENT OF LABOR  
MINE SAFETY AND HEALTH ADMINISTRATION  
Metal and Nonmetal Mine Safety and Health

REPORT OF INVESTIGATION

Surface Nonmetal Mine  
(Crushed Stone)

Fatal Machinery Accident  
February 13, 2006

Pyramid Materials  
Pyramid Materials – Div / Haines & Kibblehouse Inc  
Media, Delaware County, Pennsylvania  
Mine I.D. No. 36-08977

Investigators

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Mine Safety and Health Inspector

Thomas J. Shilling  
Mine Safety and Health Inspector

Phil McCabe  
Mechanical Engineer

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James R. Petrie, District Manager



## **OVERVIEW**

Charles R. Davis III, supervisor, age 25, was fatally injured on February 13, 2006, when he was struck by a pitman assembly that was being removed from the crusher at the secondary plant. A crane, operated by a contractor employee, was being used to remove the pitman assembly. Davis was standing on the work platform with two other employees.

The accident occurred because safe work procedures were not utilized to protect persons working at the location. The signal to “raise boom” was given before the work area was cleared of personnel. No training had been provided for the miners prior to performing the task regarding hand signals that were to be used between the miners and the crane operator.

## **GENERAL INFORMATION**

Pyramid Materials, a surface crushed stone operation, owned and operated by Pyramid Materials – Div / Haines & Kibblehouse Inc, was located in Media, Delaware County, Pennsylvania. The principal operating official was John B. Haines IV, president, and John R. Kibblehouse, secretary/treasurer. The mine operated one 10-hour shift, six days per week. Total employment was seven persons.

AmQuip (MSHA Contractor I.D. No. 4ET) was an independent contracting crane service located in Bensalem, Bucks County, Pennsylvania. The principal operating official was Frank Bardonaro, Jr., general manager. AmQuip was contracted by the mine operator to provide a crane to pick the crusher component.

Stone was blasted from multiple benches and transported by front-end loader to the crushing plant where it was broken and separated into various size materials. Finish products were sold as construction aggregate.

The last regular inspection at this operation was completed on October 6, 2005.

## **DESCRIPTION OF THE ACCIDENT**

On the day of the accident, Charles R. Davis III (victim) reported for work at 7:00 a.m., his normal starting time. The planned work for the day was to dismantle the “B” jaw crusher for repairs. Davis discussed the task with Michael S. Yorden, loader operator, and David A. Velas, mechanic. They removed snow and ice from the work area and removed guards from the crusher in preparation for the work.

Thomas Heenan, contract crane operator, arrived with the crane at approximately 10:00 a.m. Heenan moved the crane into position and set it up to perform the work. Five crane picks were made. The first pick was to remove a ladder that provided access to the screen deck above the crusher. The second pick was to remove a steel plate at the crusher, and the third and fourth were to remove the bearing caps on the pitman assembly. The fifth and final pick was the pitman assembly.

The removal of the pitman assembly was difficult because the surrounding structures restricted the crane placement. As a result, the crane’s hoist line could not be positioned directly above the pitman. The miners used metal pry bars as they attempted to maneuver the pitman assembly to enable the crane to lift it. About 12:30 p.m., when the crew thought that the assembly was free, a hand signal was given to the crane operator to “raise boom” and the miners started to exit the walkway at the crusher. As the pitman assembly cleared the crusher, the miners saw it swing toward them. Yorden fell to the work platform, turned and saw the assembly traveling over him. Velas turned to travel down the stairs and felt something hit him in the back. Velas turned and caught Davis as he was falling down the stairs behind him. Davis appeared to be unconscious and was carried to the ground by Velas and Yorden. Velas used his cell phone and Heenan ran to the scale house to call for emergency medical assistance.

Davis was transported to a local hospital where he was pronounced dead. Death was attributed to crushing blunt force trauma.

## **INVESTIGATION OF THE ACCIDENT**

MSHA was notified of the accident at 1:26 p.m. on February 13, 2006, by a telephone call from Ronald Landis, safety director, to Robert L. Carter, supervisory mine safety and health inspector. An investigation was started that day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of miners. MSHA's accident investigation team traveled to the mine, made a physical inspection of the accident scene, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees, Pennsylvania Department of Environmental Protection inspectors, and the contractor's management and employees.

## **DISCUSSION**

### **Location of the accident**

The accident occurred on the platform of the "A" and "B" jaw crushers, located at the secondary plant. The work was being conducted on the "B" jaw crusher. The weather was clear and cool; however, there had been a significant snow fall over the weekend.

### **Crusher**

The crusher involved in the accident was a Gator PEX 1039 jaw crusher. The crusher section had two units; designated as "A" and "B". The employees were removing the "B" crusher unit pitman assembly at the time of the accident. This crusher was being dismantled for scheduled repairs. The crusher tower (unit) was configured as a tall rectangular metallic structure with two sections; an upper screening section and a lower crushing section. The screening section had a catwalk/handrail installed around the perimeter of the section for access during screen maintenance. The crusher section had a catwalk/handrail installed around the perimeter of the section for access during crusher maintenance.

The pitman assembly or jaw was the component being picked during the accident. The jaw was driven through a multi grooved v-belt pulley attached to one end of a large eccentric shaft with a flywheel attached to the other end of the shaft. The jaw was supported by bearings located on this eccentric shaft. The pitman assembly body was constructed of heavy cast metal with an assembly weight of 7,100 pounds. A single cast lifting lug was positioned on top of the pitman assembly. The placement of this lifting lug permitted a single point balanced load during lifting of the pitman assembly. (Appendix B describes the pitman assembly)

### **Crane**

The crane used to lift the pitman assembly was a Koehring, Model T230, 30-ton capacity truck mounted crane. It was suitable for use on improved terrain and was equipped with five outrigger jacks. The crane had four extendable box beam outriggers, with vertical stabilizer jacks that were located on the main portion of the lifting platform and used for over the rear and side stationary picks. The fifth vertical outrigger jack, located on the front of the crane carrier, was used when picking loads over the front of the machine.

The crane had dual drive axles in the rear, a single non-driven steering axle in the front, and was equipped with over-the-road tires on all axles. It had two control cabs; one lower cab mounted on a truck carrier for driving the crane on-road and a separate upper cab mounted on a turntable superstructure used when picking and moving loads.

The lifting boom of the crane was a hydraulically driven, four-section, fully synchronized, full power boom, with a removable telescoping boom extension. The hoist was fitted with a 5/8 inch diameter wire rope with a 200-pound hoist ball and hook attached to the end of the rope. The load line was rigged as a single part line with a rating of 9,000 pounds. The crane was equipped with a safety cut out system that would only allow a load to be lowered in an overload situation.

The crane operator simulated the pick without a load. The outriggers, boom functions, and hoist operations appeared smooth and continuous without any unwanted motions. There were no visible signs of any substantial fluid leakage from under or around the crane and related components. No operational defects were found.

### **Crane positioning**

The crane placement was limited due to the configuration of the surrounding structures. The crane carrier was backed into the location. The crane placement dictated that the lift would have to be done by picking the pitman assembly from a lower level catwalk of the crusher unit over the left rear corner of the crane and swinging the boom to the right over the rear of the crane to lower the pitman assembly to the ground. The configuration of an upper catwalk located on a screen section of the crusher unit prevented a straight and unrestricted vertical pick and caused the lifting line to scrape against the upper catwalk.

This lifting configuration was not an acceptable practice according to the crane manufacturer. The crane's operating manual clearly stated the following "No attempt shall be made to drag a load horizontally on the ground in any direction." When the crane picked the pitman assembly from the mounting location, an external force was exerted onto the pitman when it slid up and out of the mount. This type of external force is similar to using the hoist rope to drag an object on the ground.

At the time of the accident, the crane was configured as follows: four extendable box beam outriggers fully extended, vertical stabilizer jacks extended downward, lifting platform level and tires suspended above the ground, boom extension stowed on side of main boom, a 200-pound hoist ball, and a single part lifting line.

The crane was found in a collapsed and stowed condition. Reportedly, the crane was not moved from the original location, only stowed. This stowed configuration was typically the way a crane would be stored after a job is completed or for transporting. The boom extension was stowed on the side of the main boom.

Appendix C indicates the relative position of the crane to the pitman assembly picking position.

### **Training and Experience**

Charles R. Davis III had 2 ½ years mining experience, all at this mine. He had received training in accordance with 30 CFR, Part 46. The crew had not received training on hand signals prior to starting the repair task. The crane operator was given the signal to “raise boom” rather than “hoist”. This action may have resulted in the pitman assembly swinging as it was moved by the crane.

## **ROOT CAUSE ANALYSIS**

A root cause analysis was conducted and the following factors were identified:

**Root Cause:** A risk assessment to determine all possible hazards and to establish safe work procedures was not conducted prior to performing the task. No procedures were in place to ensure that persons were clear of suspended loads. The location of the pitman assembly in relation to the upper level screening section catwalk on the crusher prevented a straight, perpendicular, and unrestricted crane pick causing the lifting line to scrape against the upper catwalk.

**Corrective Action:** Procedures should be established that require a risk assessment be conducted to identify and correct potential hazards associated with the task to be performed. Develop and implement safe crane operating procedures that ensure all lifting is completed according to manufacturer’s operator’s manual. Establish policies that require persons to stay clear of suspended loads.

**Root Cause:** Standards and controls were inadequate and failed to ensure that training regarding hand signals was provided to the miners by the contractor’s crane operator before performing the task.

**Corrective Action:** Procedures should be established to require that all mine and contract employees receive training regarding the proper use of hand signals when cranes are utilized to lift loads.

## **CONCLUSION**

The accident occurred because safe work procedures were not utilized to protect persons working at the location. The work area was not cleared of personnel prior to hoisting the pitman assembly to ensure they were clear of the suspended load. Training regarding hand signals was not provided to the miners prior to performing the task.

## **ENFORCEMENT ACTIONS**

### **Pyramid Materials – Div / Haines & Kibblehouse Inc**

Order No. 6034549 was issued on February 13, 2006, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on February 13, 2006, when a plant superintendent was struck by a pitman that was being lifted out of the secondary jaw crusher. This order is issued to assure the safety of persons at this operation and prohibits any work in the affected area until MSHA determines that it is safe to resume to normal operations as determined by an Authorized Representative of the Secretary of Labor. The mine operator shall obtain approval from an authorized representative for all actions to recover and/or restore operations in the affected area.

The order was terminated on February 15, 2006. Conditions that contributed to the accident have been corrected and normal mining operations can resume. The mine operator has submitted a written plan to MSHA showing the removal of the overhead walkway which would provide the space needed to make a vertical pick with a crane, without obstruction, so all repairs can be performed safely.

Citation No. 6029599 was issued on March 1, 2006, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.16009:

A fatal accident occurred at this mine on February 13, 2006, while workers were dismantling the crusher at the secondary plant. A crane was being used to lift the pitman assembly from the crusher. As the pitman assembly was being lifted, it swung, and struck the supervisor. The task proceeded although the supervisor and two co-workers were not clear of the suspended load.

This citation was terminated on March 20, 2006. All mine employees were provided with crane safety training which included the proper procedures to be used while working around suspended loads. Additional training was conducted with persons who operate cranes at the mine site.

### **AmQuip**

Citation No. 6029600 was issued on March 1, 2006, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.16009:

A fatal accident occurred at this mine on February 13, 2006, while workers were dismantling the crusher at the secondary plant. A crane was being used to lift the pitman assembly from the crusher. As the pitman assembly was being lifted, it swung, and struck the supervisor. The crane operator proceeded to lift although he could see the supervisor and two co-workers were not clear of the suspended load.

This citation was terminated on March 9, 2006. All employees were instructed in the proper procedures to be used while working around suspended loads.



Citation No. 6038201 was issued on March 1, 2006, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 46.12(b)(2):

A fatal accident occurred at this mine on February 13, 2006, while workers were dismantling the crusher at the secondary plant. A crane, operated by an independent contractor, was being used to lift the pitman assembly from the crusher. As the pitman assembly was being lifted, it swung, and struck the supervisor. The independent contractor failed to inform the production-operator of procedures and hazards created by the performance and operation of the crane at the mine. Standard hand signals and hazards associated with suspended loads were not reviewed prior to performing the task.

This citation was terminated on March 16, 2006. All employees were instructed regarding safe operating procedures and communication requirements associated with safe operation while working at the mine site.

Approved: \_\_\_\_\_

James R. Petrie  
District Manager

Date: \_\_\_\_\_

## **APPENDIX A**

### **Persons participating in the investigation**

#### **Pyramid Materials**

Ronald Landis	safety director
Michael S. Yorden	plant operator
David A. Velas	welder/mechanic
Eugene J. Dugan	worker
Raymond L. Yorden	loader operator
John D. Austin	attorney (Patton Boggs)

#### **AmQuip**

Frank Bardonaro	general manager
Thomas Heenan	crane operator
Francis J. Deasey	attorney (Deasey Mahoney & Bender Ltd.)
Adam Pantano	attorney (Deasey Mahoney & Bender Ltd.)
Brandon English	engineer (Haag Engineering)

#### **Maurer & Scott**

Dave Dalziel	blaster
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#### **Pennsylvania Department of Environmental Protection**

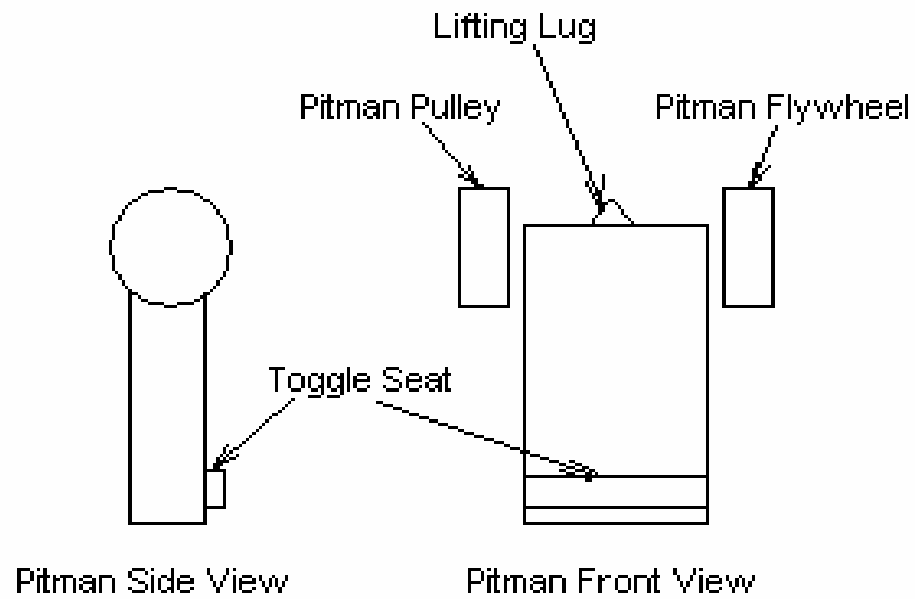
Colleen B. Stutzman	surface mine conservation inspector supervisor
Amiee Bollinger	surface mine conservation inspector

#### **Mine Safety and Health Administration**

James R. Logan	mine safety and health inspector
Thomas J. Shilling	mine safety and health inspector
John A. Dagner	mine safety and health inspector
Robert L. Carter	supervisory mine safety and health inspector
Phil McCabe	mechanical engineer
Michael P. Shaughnessy	mechanical engineer
William E. Slusser	supervisory mine safety and health specialist
Cynthia S. Shumiloff	mine safety and health specialist

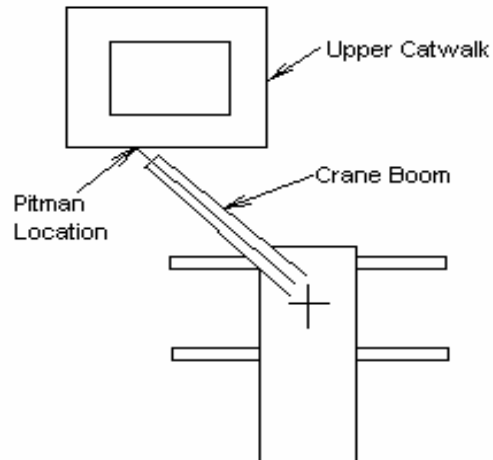
## APPENDIX B

The following illustration describes the pitman assembly (not to scale):



## APPENDIX C

The following illustration indicates the relative position of the crane to the pitman assembly picking position (not to scale):



The following illustration indicates the relative position of the crane/pitman assembly/upper catwalk picking position (not to scale):

